CONSTRUCTABILITY REVIEW OF EPA PREFERRED TECHNOLOGY AREAS

INTRODUCTION

This memorandum presents a technical discussion and a summary of potential constructability issues associated with the U.S. Environmental Protection Agency's (EPA's) Preferred Technology Screening and Assignments, as presented to the Lower Willamette Group (LWG) on April 24, 2014. Figures 1a through 1d present the EPA Preferred Technology Screening Areas overlain with draft Feasibility Study (FS) subSMAs for a selected set of Sediment Management Areas (SMAs). This memorandum indicates potential issues and suggested changes to EPA's technology assignment approach that are in addition to suggestions to the technology assignment criteria and scoring methodologies provided in the LWG's May 2, 2014 submittal to EPA on this subject.

METHODS OF REVIEW

The following sections present a review of constructability issues associated with a set of representative SMAs (SMA 1, SMA 13, SMA 14, and SMA 19) along the Lower Willamette River. While only a few SMAs were examined closely, these examples indicate potentially wider issues that should be reviewed for every SMA. To focus this review, Alternative F was considered. In performing the constructability review, the assumptions presented in Appendix G (Volume Determinations) of the draft FS (Anchor QEA 2012) were considered as reasonable assumption for most potential approaches to alternatives development. Other important reasonable assumptions of this review are as follows:

- The Depth of Impact (DOI) assigned to each remedial area is shown in Figure 1e of Appendix G.
- The maximum slope of the dredge cut is assumed to be 2 Horizontal: 1 Vertical (2H:1V) and initiates at the shoreline edge of each sub-thiessen and continues until the full DOI is achieved (Figure 4 of Appendix G).
- For the construction of cap sections, a side slope of 2H:1V was assumed.

One overall issue worth noting is that EPA's 10×10-feet assessment grid results in a "checkered" combination of intermixed technologies in many places. As discussed in recent revised FS meetings, both the LWG and EPA recognize that such checkered situations are not constructible. EPA has indicated that an additional technology assignment step will need to take place where the checkered areas are "smoothed" into more contiguous areas of technologies. The LWG supports this next step, and has suggested that the intermixed technologies patterns be evaluated in each draft FS subSMAs. Engineering judgment should be used to determine a single technology to apply within each subSMA, rather than a mixture of technologies within each subSMA. Some of the constructability issues discussed further in this memorandum should be used to help assess which single technology should be assigned to each subSMA.

CONSTRUCTABILITY REVIEW OF SMA 1

Figure 1a presents a focused view of the EPA's Preferred Technology assignments for SMA 1. Included are notes for selected areas that present examples of potential constructability issues. Constructability concerns are discussed in detail as follows.

- **Note 1—Dredging Underpier**—Dredge areas are assigned under the heavily supported pier structures outlined in Figure 1a and labeled F-SS-1025 and F-SS-1026. Closely spaced vertical piles, batter piles, and cross bracing present for this and other heavy structures would make construction access difficult for these and other similar over-water structures. In addition, stability evaluations would be necessary prior to the removal of soil adjacent to pilings.
  - Technical Difference with the LWG approach—Removal under heavy structures is screened out of the LWG's technology matrix due in part to the aforementioned concerns. It is assumed that floating docks can be temporarily relocated for potential dredging.
- **Note 2—Dredging Adjacent to Piers**—Although difficult to observe, the resolution on EPA's grid cells appears to indicate that dredge areas are sometimes assigned immediately adjacent to over water structures. Limitations in the accuracy of dredge equipment and the stability of pilings would have to be addressed prior to dredging adjacent to structures.
  - Technical Difference with the LWG approach—Areas identified as "SS" (heavy structure) include a 5-foot horizontal buffer from the edge of structures to account for dredge equipment and piling stability.
- **Note 3—Dredge Slopes Below Cap/EMNR Areas**—This area, as shown in Figure 1a, indicates dredging along the toe of a slope that is typically 5H:1V to 3H:1V, and as steep as 1H:1V across small areas. The DOI in this area is 9 feet, and the area is downslope of a Cap Area. In order to achieve the full DOI here, the dredge slope of 2H:1V may require the removal of sediments 30 to 50 feet upslope of the dredge area. Because the Cap/ Enhanced Monitored Natural Recovery (EMNR) area is approximately 80 feet wide (in the direction of the slope), the resulting constructible "cap only" area would be significantly reduced.
  - Technical Difference with the LWG approach—Steeply sloped areas in the Lower Willamette River typically are in the Open Water (OW) or Wave Zone (WZ) areas. Future Maintenance Dredge (FD) and Navigation Channel (NC) areas are typically further from the shoreline and are in flatter areas. To present constructible alternatives near the shoreline on slopes, the LWG's –r(removal) and –i(integrated) alternatives avoid this constructability issue by applying either dredging or capping/EMNR to the slope areas and not intermixing the two. This issue potentially impacts many areas throughout the SMAs, including Note 4.
- **Note 4—Dredge Slopes and Cap/EMNR Areas**—This area has similar constructability concerns as Note 3. When cap or EMNR areas are immediately upslope or downslope of a dredge area, daylighting of the dredge slope at 2H:1V can result in removal of sediments in the cap/EMNR area. The effect of alternating technologies on a slope is shown in Figure 2 (cross section A-A'). The area mid-slope identified by EPA as appropriate for EMNR would require side slope dredging. For constructability, and in part due to slopes and a DOI of

approximately 10 feet, the effective area for EMNR is reduced to approximately 25 percent of the original size.

- Technical Difference with the LWG approach—As discussed in Note 3, the LWG's approach does not result in frequent alternating of technologies on slopes. In addition to constructability concerns, the effect of alternating technologies (placing cap material at the midpoint, or top of slopes, while removing material from the toe of the slope) can be risky from a slope stability standpoint. Constructability Review of SMA 13

Figure 1b presents a focused view of the EPA's technology assignments for SMA 13 and notes for areas that present examples of constructability concerns. Potential constructability issues are discussed in detail as follows.

- **Note 5—Dredge Slopes and Cap/EMNR Areas**—This area has similar constructability concerns as discussed in Note 3 and 4. Because the DOI in this area is 2 feet and the slope in this area is approximately 4H:1V, the dredge slope daylights approximately 10 feet upslope of the dredge area. This would likely prevent any combination of EMNR/Capping and dredging across this slope.

CONSTRUCTABILITY REVIEW OF SMA 14

Figure 1c presents a focused view the EPA's technology assignments for SMA 14 and notes for areas that present examples of constructability concerns. Constructability concerns are discussed in detail as follows.

- **Note 6—Dredge Slopes and Cap/EMNR Areas**—This area has similar constructability concerns as discussed in Note 3, 4, and 5. Dredging adjacent to these small areas results in removal of sediments in areas identified by EPA as appropriate for cap. Because the DOI in this area is 10 to12 feet, and the slope in this area is approximately 5H:1V, the dredge slope would daylight approximately 40 to 50 feet upslope of the dredge area. The majority of the cap areas identified here would be partially dredged, potentially resulting in clean surfaces that may not require further remediation.
- **Note 7—Dredging Adjacent to Piers**—This area has similar constructability concerns as discussed in Note 2.
- **Note 8—Dredging Underpier**—This area has similar constructability concerns as discussed in Note 1.

CONSTRUCTABILITY REVIEW OF SMA 19

Figure 1d presents a focused view the EPA's technology assignments for SMA 19 and notes for areas that present examples of constructability concerns. Constructability concerns are discussed in detail as follows.

- **Note 9—Dredge Slopes and Cap/EMNR Areas**—This area has similar constructability concerns as discussed in Notes 3, 4, 5, and 6. The DOI in this area ranges from 4 to 12 feet, with a slope of approximately 13H:1V, so the

dredge slope will daylight approximately 10 to 30 feet upslope into the adjacent EMNR area.

- **Note 10—Dredging Underpier**—This area has similar constructability concerns as discussed in Notes 1 and 8.
- **Note 11—Site-specific Features**—This area highlights the shoreline area of SMA 19. Present on the shoreline of this area are waterfront skid structures that allow for the launching of large vessels or barges to the Willamette River. These skids structures extend into the river and are partially submerged. The preferred EPA technology on the waterside portion of this area is "Cap", while the shoreline portion is identified mostly as "Dredge". Capping over submerged skids and reducing water depths may reduce or eliminate the usefulness of this structure. In addition, dredging under or adjacent to the structures could reduce structural capacity or render structures unusable.
  - Technical Difference with the LWG approach—Based on the Technology matrix presented in the Portland Harbor RI/FS, this entire area is treated similarly in –r and –i alternatives because the area is categorized as limited access due to structures (SL).
- **Note 12—Site-specific Features**—This area highlights subSMA F-SU-WZ-19050. This area is entirely surrounded by heavy structures and only accessible from the upland, as indicated by the "SU" sub-SMA type. While the majority of this sub-SMA is identified as Dredge by the EPA's preferred technology, a small portion is identified as Cap.
  - Technical Difference with the LWG approach—Based on the Technology matrix presented in the Portland Harbor RI/FS, this entire area is treated similarly in –r and –i alternatives because the area is categorized as shoreline access due to structures (SU).

OTHER CONCERNS – SMA 25

Similar to Notes 11 and 12, it is the LWG's opinion that physical features are sometimes not appropriately assessed in the technology screening process. For example, the shoreline area of subSMA F-SN-25037 in SMA 25 is shown mostly as a Dredge area by the EPA technology screening process. Figure 3 shows an isometric photograph of this area, and the approximate location of this subSMA. This area is at the toe of a steeply sloped bank, and is surrounded by heavy structures, and is inaccessible from the shore due to a steeply sloped and vegetated bank. Near the crest of this slope are sensitive structures that include large diameter grain elevators, (approximately 40-foot diameter). Due to these physical features, this area is labeled "SN"—Behind Structures with No Access in the Portland Harbor RI/FS.

SUMMARY

Upon review of the EPA's Preferred Technology screening, the following potential constructability issues commonly arise:

- Dredging is selected as the preferred technology for underpier areas. It is the LWG's opinion that dredging is not constructible under most structures in the Lower Willamette River, due to overhead obstructions, cross bracing, tightly spaced pilings, and concerns regarding the stability and embedment of piles.
- Dredge offsets for structures should be considered in the technology screening process.
- Physical features should be considered in remedial technology selection (e.g., SMA 19 and SMA 25 SN areas, as discussed previously)
- Alternating remedial technologies (dredging, EMNR, and capping) on slopes will be difficult to implement when cap/EMNR areas are sandwiched between dredge areas on slopes. Capping and EMNR upslope of dredge areas will also present constructability concerns when the DOI is large or existing slopes are steep. For example, the following combinations of DOI and existing slopes result in daylight distances greater than 25 feet upslope of the dredge area:
  - DOI of 6 feet (or greater), slopes of 4H:1V (or steeper)
  - DOI of 10 feet (or greater), slopes of 6H:1V (or steeper)

These issues appear to occur in many other SMAs as well indicating the need for a site-wide constructability review. Also, as noted previously, several other refinement steps may be needed including the following:

- The "smoothing" of technology assignments across larger areas such as subSMAs
- Technology assignment criteria and scoring methodologies provided in the LWG's May 2, 2014 submittal to EPA on this subject.

REFERENCES

Anchor QEA, LLC, Windward Environmental, LLC, and Kennedy/Jenks Consultants, 2012. Portland Harbor RI/FS. Draft Feasibility Study. Prepared for The Lower Willamette Group. March 2012.

LEGEND

- EPA SubSMA Alt F
- River miles
- Portland Harbor Study Area
- Docks and Structures
- Tax Lots
- Navigation Channel
- Existing Remediation Cap
- Contour 2ft

EPA Preferred Technology

- Cap
- Dredge
- EMNR

Refers to Area of Constructability Concern
See Technical Memorandum for Discussion

Feet
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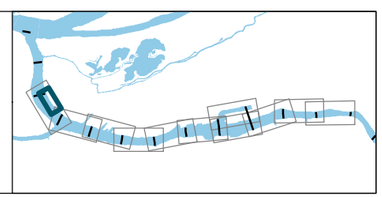

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Figure 1a
Portland Harbor RI/FS
Draft Feasibility Study
EPA Preferred Technology Analysis - SMA 1

LEGEND

- EPA SubSMA Alt F
- River miles
- Portland Harbor Study Area
- Docks and Structures
- Tax Lots
- Navigation Channel
- Existing Remediation Cap
- Contour 2ft

EPA Preferred Technology

- Cap
- Dredge
- EMNR

Refers to Area of Constructability Concern
See Technical Memorandum for Discussion

Feet
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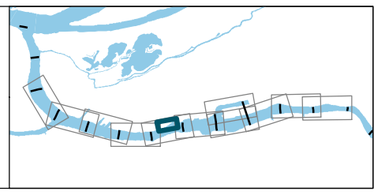

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Figure 1b
Portland Harbor RI/FS
Draft Feasibility Study
EPA Preferred Technology Analysis - SMA 13

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LEGEND

- EPA SubSMA Alt F
- River miles
- Portland Harbor Study Area
- Docks and Structures
- Tax Lots
- Navigation Channel
- Existing Remediation Cap
- Contour 2ft

EPA Preferred Technology

- Cap
- Dredge
- EMNR

- Refers to Area of Constructability Concern See Technical Memorandum for Discussion

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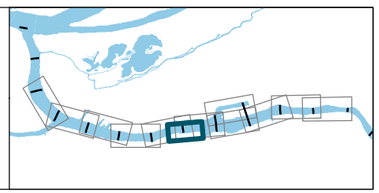

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Figure 1c
Portland Harbor RI/FS
Draft Feasibility Study
EPA Preferred Technology Analysis - SMA 14

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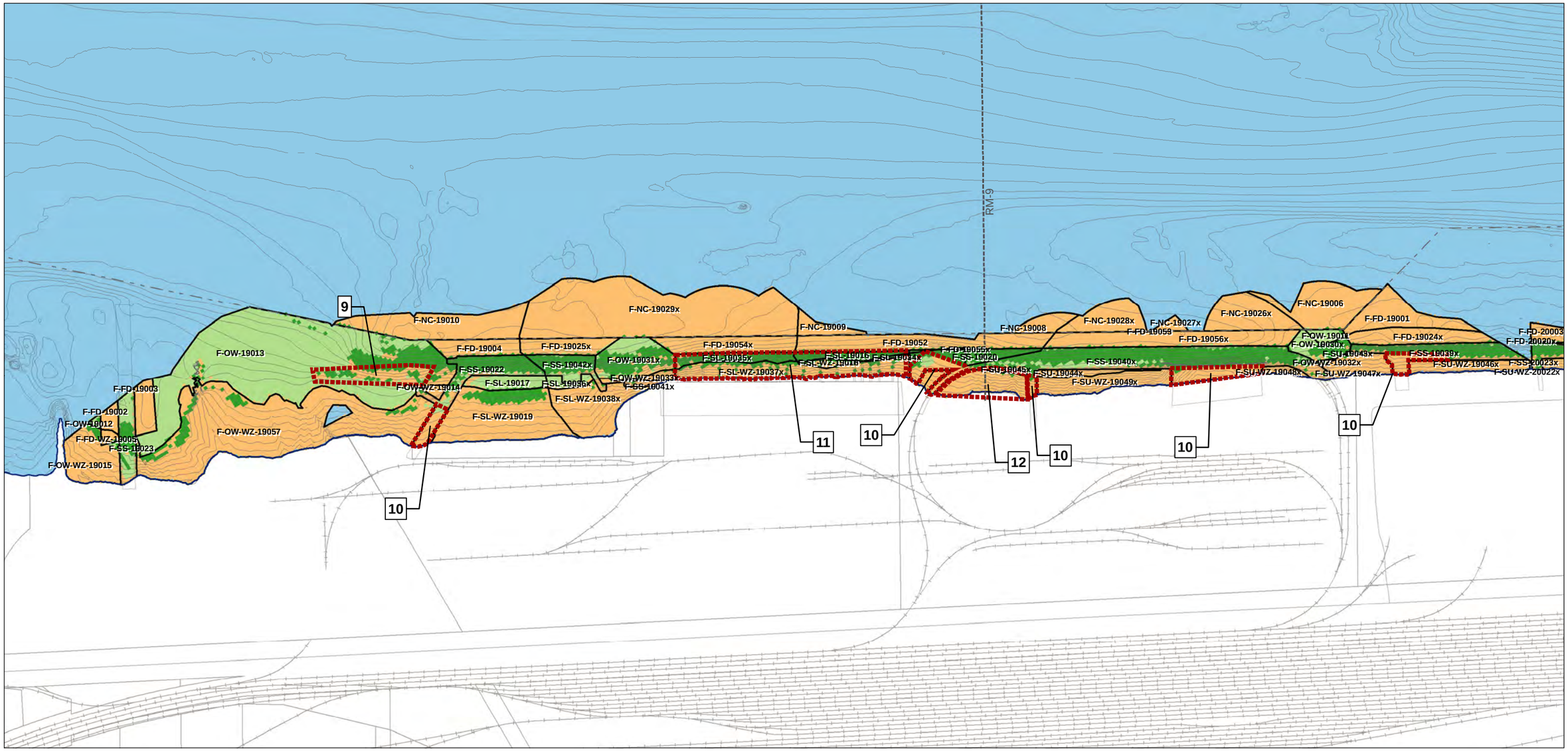

LEGEND

- EPA SubSMA Alt F
- River miles
- Portland Harbor Study Area
- Docks and Structures
- Tax Lots
- Navigation Channel
- Existing Remediation Cap
- Contour 2ft

EPA Preferred Technology

- Cap
- Dredge
- EMNR

Refers to Area of Constructability Concern
See Technical Memorandum for Discussion

Feet
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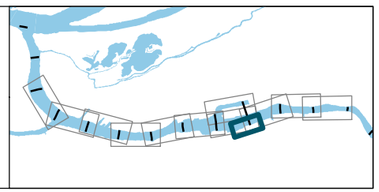

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Figure 1d
Portland Harbor RI/FS
Draft Feasibility Study
EPA Preferred Technology Analysis - SMA 19

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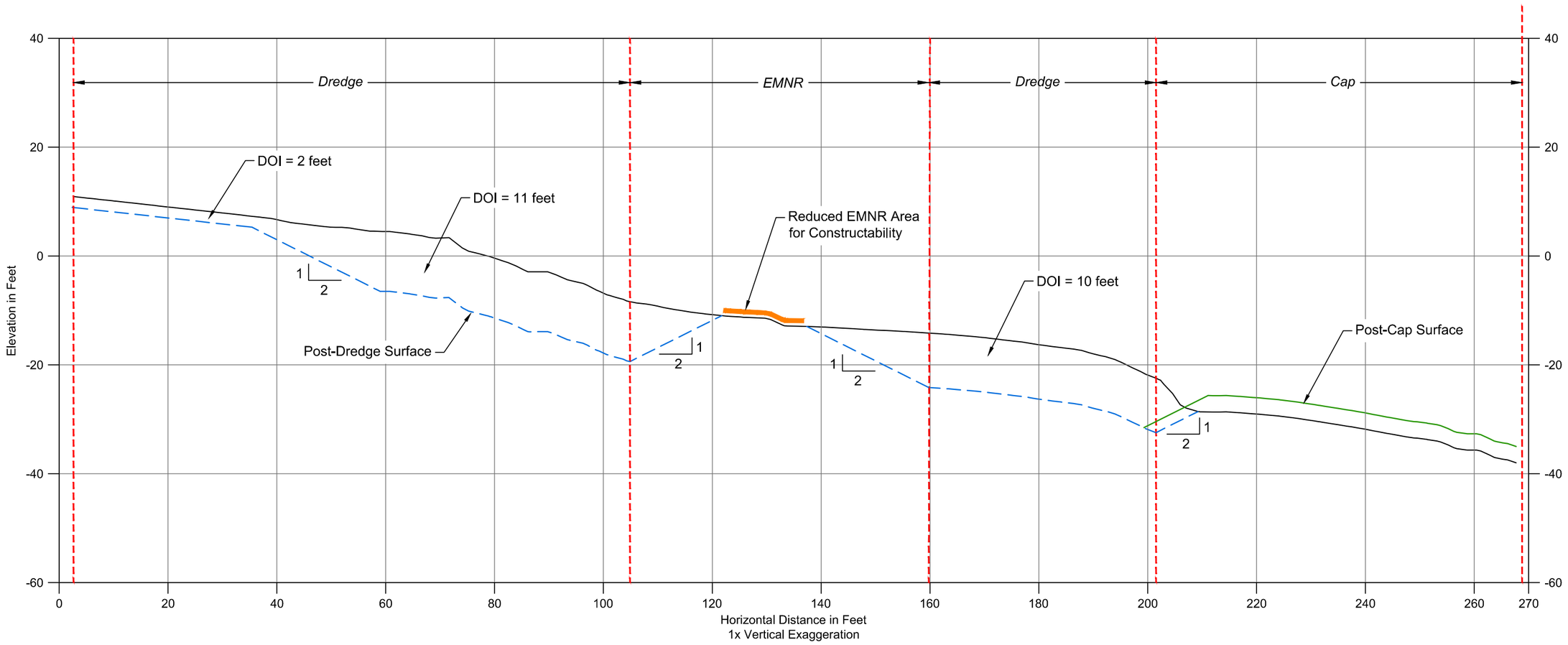

HORIZONTAL DATUM: Oregon North State Plane NAD83, International Feet.

VERTICAL DATUM: NAVD88

NOTE: DOI = Depth of Impact

LEGEND:

- EPA Preferred Technology Areas
- Post-Dredge Surface - Alternative F, EPA Preferred Technology
- Post-Cap Surface - Alternative F, EPA Preferred Technology
- EMNR Area - Alternative F, EPA Preferred Technology

0 20
Scale in Feet

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Figure 2
Portland Harbor RI/FS
EPA Preferred Technology Analysis
Cross Section A-A' - SMA 1

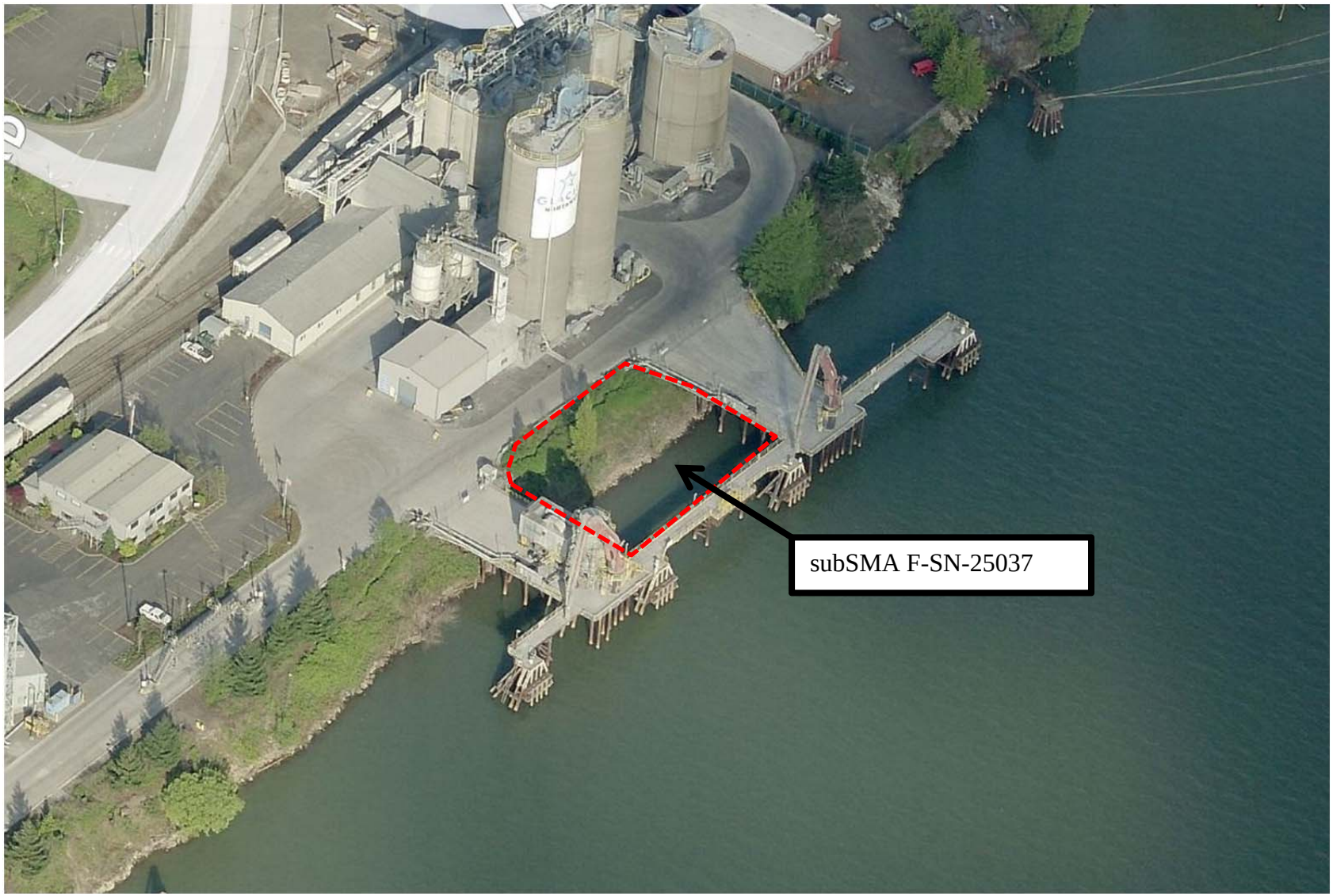

Image Source: Bing Maps.